Fertile mules

A recent report in this journal[1] highlighted the 'once in a blue moon' phenomenon of mule fertility[2] by describing the birth of a foal to a female mule (jack donkey × mare) in China. The publication was the first in the world literature to provide convincing cytogenetic and biochemical evidence for an event of this kind. It was followed just two weeks later by a report of female mule fertility in the USA[3], the study again being backed by good scientific documentation.

Prior to these two investigations, all claims made for the production of offspring to these equine hybrids had been treated with extreme scepticism by scientists and mule breeders alike, and because chromosomal karyotyping was not technically possible in the early days, there was no means of providing verification. Nevertheless, the anecdotal reports presented over the years have included several from what might be considered reliable sources. Perhaps the best documented fertile she-mule of the past was 'Old Bec', owned by Texas A and M College during the 1920s[4]. Judging by a published photograph, she appeared to be a mule, yet she produced two offspring. One was a typical she-mule sired by a donkey, the other a horse described as being 'of good conformation', sired by a stallion. The types of progeny produced by 'Old Bec' were consistent with other anecdotal reports in showing that when a female mule has mated with a donkey, the progeny are mule or mule-like, and when mated to a horse, they are horse or horse-like. Furthermore, the progeny of rare female hinnies (stallion × jenny donkey), when sired by donkeys, are always donkey.

In the case studied in China by Rong and his colleagues[1], the sire of the mule foal had been a donkey with which the mother mule had been stabled over a long period of time. In appearance, the filly foal, 'Dragon Foal', had mule-like head and ears and broad shoulders, but donkey legs, hindquarters and tail. The colt foal produced in the USA, also sired by a donkey, resembled a mule both phenotypically and chromosomally[3].

Now in China a fertile hinny has also been investigated, karyotypes showing that the mother is indeed a hybrid animal (Rong, unpublished observations). Again, a filly foal has been sired by a donkey, the foal resembling a donkey.

Chromosomally, both 'Dragon Foal' and the hinny foal are hybrid animals, the karyotypes, however, showing less of a departure from the full parental genomes than is shown by the mule and hinny. In the case of 'Dragon Foal', the sex chromosome complement is pure donkey, but autosomally there is a mixture of horse and donkey elements including some donkey pairs. The chromosome number is 2n = 62, the same as that of a donkey, and chromosomally she is nearer to being a donkey. The hinny foal shows one horse and one donkey X chromosome, and again a mixture of horse and donkey elements, including some donkey pairs among the autosomes. The count is 2n = 63, the same as that for the mule and hinny. She too is closer to the donkey chromosomally. These two foals, together with Ryder's mule foal[3], demonstrate quite strikingly how different chromosomal mixtures from the horse and donkey can combine to produce viability among offspring. In spite of the divergence of the horse and donkey karyotypes over evolutionary time, sufficient genetic homology must remain to allow these unusual genotypes to function harmoniously and allow survival.

Far from being cosseted as a specimen of unique genetic constitution, 'Dragon Foal' can be seen every morning pulling the cart around the farm of the Genetics Institute, Academia Sinica, in Beijing. Like the thousands of mules and hinnies working the farms in Northern China, she too must work for her living!

The rhetorical question of why mule and hinny fertility is such a rare event may finally be asked. In answering it, one has to realize that the phenomenon under discussion is the product of two rare events with a possible third restriction in addition. Normal meiotic pairing and germ cell production are both known to be rare in mules and hinnies[5,6], and the chances of a mule or hinny in oestrous being served by a stallion or donkey will probably also be low. Nevertheless, the Chinese appear never to have doubted the occurrence of fertility in mules and hinnies, and around the provinces of China a number of other suspected cases await investigation (Rong, personal communication). There may indeed be more fertile mules than has previously been supposed. Science has a way of producing numerous examples of a rare phenomenon once the first case has been described!

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